

PATENT ABSTRACTS OF JAPAN

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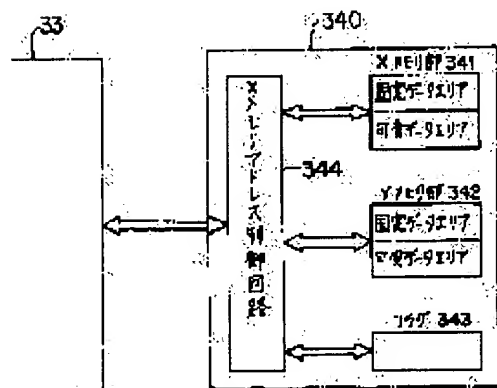
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(54) NON-CONTACT IC CARD TYPE GATE DEVICE

(57)Abstract:

PURPOSE: To provide a non-contact IC card type gate device which can continue communication by re-operation and can complete the communication by the re-operation even if abnormality due to the uncompletion of the communication occurs.

CONSTITUTION: In the gate device in which a gate with a station capable of communicating with a non-contact IC card presented to a communicable area is provided, and the non-contact IC card having received a challenge signal repeated at a prescribed period by the corresponding station executes a series of the communication with the station and informs of the permission/non- permission of the passing of the gate, it is characterized as follows. The non- contact IC card is provided with two switchable data memories 341, 342 in which the same fixed data is written, and simultaneously, it is provided with a data memory switch flag 343 to be inverted automatically at every completion of the series of the communication, and the read-out of data from the



memories 341, 342 is executed from the data memory corresponding to the contents of the flag 343, and the write-in of the data is executed to the other memory.

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CLAIMS

[Claim(s)]

[Claim 1] It has the noncontact IC card presented to the field which can be communicated, and the gate which has the station which can be communicated. In the gating arrangement with which the above-mentioned noncontact IC card which received the appeal signal which the station concerned repeats a predetermined period performs a series of communications with the above-mentioned station, and notifies authorization/disapproval of gate passage While having the above-mentioned noncontact IC card possible [a change of two data memory which wrote in the same fixed data] It is the non-contact IC card system gating arrangement characterized by having the data memory change flag automatically reversed for every completion of communication of a top Norikazu ream, performing read-out from memory from the data memory corresponding to the contents of the flag concerned, and performing writing to another data memory.

[Claim 2] A noncontact IC card is a non-contact IC card system gating arrangement according to claim 1 characterized by putting the current contents of a flag of a data memory change flag on the reply signal answered and transmitted to the received above-mentioned appeal signal, transmitting to it, and for the station of the gate specifying the data memory corresponding to these contents of a flag, and communicating with the above-mentioned noncontact IC card.

[Claim 3] A noncontact IC card is a non-contact IC card system gating arrangement characterized by having the circuit which specifies the data memory corresponding to the reversed flag while reversing the flag for a data memory change for every completion of a series of communications.

[Claim 4] The station of the gate is a non-contact IC card system gating arrangement according to claim 1 to 3 characterized by having the display which directs reoperation when the abnormalities of communication are detected.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is equipped with the noncontact IC card presented to the field which can be communicated, and the gate which has the station which can be communicated, and relates to the non-contact IC card system gating arrangement with which the above-mentioned noncontact IC card which received the appeal signal which the station concerned repeats a predetermined period performs necessary communication with the above-

mentioned station, and notifies authorization/disapproval of gate passage.

[0002]

[Description of the Prior Art] In recent years, memory is built in with a microcomputer etc., data processing capacity is given to the card itself, storage capacity is also increased by leaps and bounds as compared with a magnetic card, and the noncontact IC card which talks with an external device on radio is developed.

[0003] While the typical thing of this noncontact IC card absorbs the vibrational energy concerned with echo sounder receivers, such as an antenna, also at the place of the vibrational energy (for example, induction field by the electromagnetic wave) which an external device generates and transforms it into power, it takes out and carries out signal processing of data and the instruction which are included in vibrational energy, performs identification code, read-out processing of data, etc. based on modification of data, an addition, or a read-out instruction, and answers the above-mentioned external device.

[0004] Gating arrangements, such as a wicket of the station at the time of using this kind of noncontact IC card for a commuter pass etc., will talk by the commuter pass concerned etc. and wireless, as shown in drawing 7.

[0005] In drawing 7, 10 is the gate of a wicket and has contained the fixed station 20 shown in drawing 8. In drawing 7, 11 is a judgment display. 30 builds in the circuit as been the noncontact IC card which PAX M holds and shown in drawing 8.

[0006] In this configuration, from the transceiver antenna (loop antenna) 21, the fixed station 20 repeated the appeal signal (trigger signal) So the short fixed period (several 10ms), and is emitting it. If it is presented to the field (on an antenna less than 25cm) which can be communicated as a noncontact IC card 30 shows drawing 7, as shown in the communication chart of drawing 9 The noncontact IC card 30 concerned receives the above-mentioned appeal signal (trigger signal) So. After decoding in a control circuit 33 after restoring to this in a demodulator circuit 32, and transmitting a reply signal Q, Fixed data, such as an arrival-and-departure station stored in memory 34, a course station, and the term of validity, are read in predetermined sequence, the data concerned are modulated in a modulation circuit 35, and through emission of the transceiver antenna (loop antenna) 31 is carried out. It gets over in a demodulator circuit 22, and the fixed station 20 which received the signal which carried this data collates with the data for collating with which delivery and a control circuit 23 store the data concerned in memory 24 in the control circuit 23, and judges authorization/disapproval of passage of the PAX. In permitting passage, it transmits that and a necessary instruction to a noncontact IC card 30 through a modulation circuit 25 and the transceiver antenna (loop antenna) 21. A fixed station 20 is answered [that performed a series of processings based on the above-mentioned instructions (adjustable / of a use day, a use time of day, a use station, etc., etc. / , or write-in command of updating data), and processing was completed, and] in the noncontact IC card 30 which received this signal. The fixed station which received this reply displays passage authorization on the judgment display 11.

[0007] In addition, the transceiver antenna (loop antenna) 21 has given the die length which is sufficient for securing the time amount which communication of the noncontact IC card 30 top Norikazu ream of one PAX who passes while he walks along the gate completes.

[0008]

[Problem(s) to be Solved by the Invention] Although the time amount which completion of communication of a top Norikazu ream takes is about 0.1 - 0.2 seconds, by the condition and card presentation posture of flow of those who pass through the gate, it may become, because the

circumference of communication area is held up momentarily, and in such a case, communication time is insufficient, and it cannot complete a series of above-mentioned communications, but the abnormalities in communication generate it. Although that directs reoperation "should let communication area pass once again" and continuation by reoperation is possible for it since such a situation occurred during readings (an arrival-and-departure station, a course station, term of validity, etc.) of the fixed data from a noncontact IC card 30 When the above-mentioned variable data to the memory 34 of a noncontact IC card 30 is writing in, it becomes data which write-in data carry out old and new *****, and are unreliable, the continuation by reoperation becomes useless, and a noncontact IC card 30 becomes use impossible.

[0009] Although what is necessary is to enlarge a loop antenna and just to give allowances to communication time, in order to prevent this, if communication area becomes large, the problem of interference with other cards will occur shortly.

[0010] It was made in order that this invention might solve this problem, and even if the abnormalities resulting from communication un-completing occur, continuation by reoperation is possible and it aims at offering the non-contact IC card system gating arrangement which can complete communication by reoperation.

[0011]

[Means for Solving the Problem] In order that this design may attain the above-mentioned purpose, in claim 1 It has the noncontact IC card presented to the field which can be communicated, and the gate which has the station which can be communicated. In the gating arrangement with which the above-mentioned noncontact IC card which received the appeal signal which the station concerned repeats a predetermined period performs a series of communications with the above-mentioned station, and notifies authorization/disapproval of gate passage While having the above-mentioned noncontact IC card possible [a change of two data memory which wrote in the same fixed data] It has the data memory change flag automatically reversed for every completion of communication of a top Norikazu ream, read-out from memory was performed from the data memory corresponding to the contents of the flag concerned, and writing was taken as the configuration performed to another data memory.

[0012] In claim 2, the current contents of a flag of a data memory change flag were put on the reply signal answered and transmitted to the received above-mentioned appeal signal, it transmitted to it, and the station of the gate considered the noncontact IC card as the configuration which specifies the data memory corresponding to these contents of a flag, and communicates with the above-mentioned noncontact IC card.

[0013] In claim 3, the noncontact IC card was considered as the configuration which has the circuit which specifies the data memory corresponding to the reversed flag while it reversed the data memory change flag for every completion of a series of communications.

[0014] In claim 4, the station of the gate was taken as the configuration equipped with the display which directs reoperation, when the abnormalities of communication were detected.

[0015]

[Function] In this invention, read-out of fixed data is performed from the memory section specified by a flag, and the writing of the variable data from the station side of the gate is performed to another memory section until a series of communications are completed.

[0016]

[Example] Hereafter, the example of this invention is explained with reference to a drawing.

[0017] The [1st example] One example of this invention is hereafter explained with reference to

a drawing.

[0018] In drawing 1 , 340 is data memory, and as shown in drawing 2 , it is classified into X memory section 341, Y memory section 342, and the memory section 343 for flags. 344 is a memory address control circuit and carries out an exchange of a control circuit 33 and a signal. X memory section 341 and Y memory section 342 consist of a read-only fixed data area and an adjustable data area read-out / both for write-in, and the data of the same contents are written in the fixed data area of both the memory sections 341 and 342. In addition, in this example, the flag "0" is assigned to X memory section 341, and the flag "1" is assigned to Y memory section 342.

[0019] Next, it explains with reference to the operation flow chart of the control circuit 24 which shows actuation of this example to drawing 5 , and the communication chart of (A) of drawing 6

[0020] Now, the change flag "0" shall be stored in the memory section 343 for flags.

[0021] From the transceiver antenna (loop antenna) 21, the fixed station 20 repeated the appeal signal (trigger signal) So the short fixed period (several 10ms), and is emitting it. If a noncontact IC card 30 is presented to said field (on an antenna less than 25cm) which can be communicated, as shown in the communication chart of (A) of drawing 6 , after the noncontact IC card 30 concerned receives the above-mentioned appeal signal (trigger signal) So and restores to this in a demodulator circuit 32, it will be decoded in a control circuit 33, and will transmit a reply signal Q. At this time, by this example, a flag "0" is read from the flag memory section 343, and a reply signal Q carries this flag "0", and is transmitted. In a fixed station 20, X memory section 341 is specified from a flag "0", and the read-out command (lead command) to X memory section 341 is transmitted. A noncontact IC card 30 reads fixed data, such as an arrival-and-departure station stored in X memory section 341 of memory 340 based on the above-mentioned lead command from a fixed station 20, a course station, and the term of validity, in predetermined sequence, modulates the fixed data concerned in a modulation circuit 35, and carries out through emission of the transceiver antenna (loop antenna) 31. It gets over in a demodulator circuit 22, and the fixed station 20 which received the signal which carried these fixed data collates with the data for collating with which delivery and a control circuit 23 store the fixed data concerned in memory 24 in the control circuit 23, and judges authorization/disapproval of passage of the PAX. In permitting passage, it transmits that and necessary instructions (information written in a write-in command and Y memory section) to a noncontact IC card 30 through a modulation circuit 25 and the transceiver antenna (loop antenna) 21. A fixed station 20 is answered [that performed write-in processing to Y memory section 342 of variable datas, such as a series of processings based on the above-mentioned instruction, for example, a card use day, use time of day, and a use station, and processing was completed, and] in the noncontact IC card 30 which received this signal. A flag change command is transmitted in the fixed station 20 which received this reply. Thereby, a noncontact IC card 30 performs flag reversal (the contents of the flag memory section 343 are set to "1").

[0022] When read-out of the fixed data from the (1) noncontact IC card 30 is not completed in predetermined time in this example, (2) When the write-in processing to Y memory section <TXF FR=0001 HE=190 WI=080 LX=0200 LY=0300> 342 (or X memory section 341) based on the instruction from a fixed station 20 is not completed in predetermined time, (3) When the time amount from this point in time to flag reversal exceeds predetermined time, a fixed station 20 judges with abnormalities (communication un-completing), generates an abnormality signal, and displays the message which requests and directs reoperation on abnormality display 11A

prepared in the gate 10 as shown in drawing 5 .

[0023] If PAX M presents a noncontact IC card 30 to a communication area again according to these directions, since the flag is not reversed, a change flag "0" is read from the flag memory section 343, a reply signal Q carries this change flag "0", and is transmitted, and the same processing sequence as the above is repeated.

[0024] In this example, since read-out of the fixed data of memory 340 is performed from the memory section specified by a flag and the writing of a variable data (updating data) is performed to another memory section, even if PAX M reoperates, old and new data which were described above are mixed, and are not written in.

[0025] The [2nd example] Drawing 3 is what showed the 2nd example of this invention, and is different from the 1st example of drawing 2 in the point of having the address change-over circuit 345 and the flag generating section (for example, flip-flop) 346. In addition, the communication chart of this example is shown in (B) of drawing 6 .

[0026] In this example, when a flag is "0", the address change-over circuit 345 chooses X memory section 341, and when a change flag is reversed to "1", the address change-over circuit 345 chooses X memory section 341.

[0027] In this case, as for reversal of a change flag, a control circuit 33 orders the flag generating section 346 a change within a noncontact IC card 30 at the time of write-in completion of the variable data to X memory section 341 or Y memory section 342, and the contents of this flag are not put on a reply signal Q.

[0028] If it does in this way, it is not necessary to put a flag "0" or "1" on a reply signal Q, and a fixed-station 20 side will have the unnecessary judgment of a change flag etc., and the part and a program will become easy.

[0029]

[Effect of the Invention] This invention until it has the two memory sections which wrote in the same fixed data and a series of communications are completed as explained above Since read-out of data is performed from the memory section specified by a flag and the writing of data is performed to another memory section, when the abnormalities resulting from communication un-completing occur, even if it reoperates Since the memory operation in front of an abnormal occurrence is reproducible, there is no old and new ***** squirrel ***** , and write-in data can continue and can complete communication.

TECHNICAL FIELD

[Industrial Application] This invention is equipped with the noncontact IC card presented to the field which can be communicated, and the gate which has the station which can be communicated, and relates to the non-contact IC card system gating arrangement with which the above-mentioned noncontact IC card which received the appeal signal which the station concerned repeats a predetermined period performs necessary communication with the above-mentioned station, and notifies authorization/disapproval of gate passage.

PRIOR ART

[Description of the Prior Art] In recent years, memory is built in with a microcomputer etc., data processing capacity is given to the card itself, storage capacity is also increased by leaps and bounds as compared with a magnetic card, and the noncontact IC card which talks with an external device on radio is developed.

[0003] While the typical thing of this noncontact IC card absorbs the vibrational energy concerned with echo sounder receivers, such as an antenna, also at the place of the vibrational energy (for example, induction field by the electromagnetic wave) which an external device generates and transforms it into power, it takes out and carries out signal processing of data and the instruction which are included in vibrational energy, performs identification code, read-out processing of data, etc. based on modification of data, an addition, or a read-out instruction, and answers the above-mentioned external device.

[0004] Gating arrangements, such as a wicket of the station at the time of using this kind of noncontact IC card for a commuter pass etc., will talk by the commuter pass concerned etc. and wireless, as shown in drawing 7.

[0005] In drawing 7, 10 is the gate of a wicket and has contained the fixed station 20 shown in drawing 8. In drawing 7, 11 is a judgment display. 30 builds in the circuit as been the noncontact IC card which PAX M holds and shown in drawing 8.

[0006] In this configuration, from the transceiver antenna (loop antenna) 21, the fixed station 20 repeated the appeal signal (trigger signal) So the short fixed period (several 10ms), and is emitting it. If it is presented to the field (on an antenna less than 25cm) which can be communicated as a noncontact IC card 30 shows drawing 7, as shown in the communication chart of drawing 9 The noncontact IC card 30 concerned receives the above-mentioned appeal signal (trigger signal) So. After decoding in a control circuit 33 after restoring to this in a demodulator circuit 32, and transmitting a reply signal Q, Fixed data, such as an arrival-and-departure station stored in memory 34, a course station, and the term of validity, are read in predetermined sequence, the data concerned are modulated in a modulation circuit 35, and through emission of the transceiver antenna (loop antenna) 31 is carried out. It gets over in a demodulator circuit 22, and the fixed station 20 which received the signal which carried this data collates with the data for collating with which delivery and a control circuit 23 store the data concerned in memory 24 in the control circuit 23, and judges authorization/disapproval of passage of the PAX. In permitting passage, it transmits that and a necessary instruction to a noncontact IC card 30 through a modulation circuit 25 and the transceiver antenna (loop antenna) 21. A fixed station 20 is answered [that performed a series of processings based on the above-mentioned instructions (adjustable / of a use day, a use time of day, a use station, etc., etc. /, or write-in command of updating data), and processing was completed, and] in the noncontact IC card 30 which received this signal. The fixed station which received this reply displays passage authorization on the judgment display 11.

[0007] In addition, the transceiver antenna (loop antenna) 21 has given the die length which is sufficient for securing the time amount which communication of the noncontact IC card 30 top Norikazu ream of one PAX who passes while he walks along the gate completes.

EFFECT OF THE INVENTION

[Effect of the Invention] Until it has the two memory sections which wrote in the same fixed data and a series of communications are completed as this invention was explained above, Since read-out of data is performed from the memory section specified by a flag, the writing of data is performed to another memory section and the memory operation in front of an abnormal occurrence can be reproduced even if it reoperates when the abnormalities resulting from communication un-completing occur, there is no old and new ***** squirrel ***** , and write-in data can continue and can complete communication.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the time amount which completion of communication of a top Norikazu ream takes is about 0.1 - 0.2 seconds, by the condition and card presentation posture of flow of those who pass through the gate, it may become, because the circumference of communication area is held up momentarily, and in such a case, communication time is insufficient, and it cannot complete a series of above-mentioned communications, but the abnormalities in communication generate it. Although that directs reoperation "should let communication area pass once again" and continuation by reoperation is possible for it since such a situation occurred during readings (an arrival-and-departure station, a course station, term of validity, etc.) of the fixed data from a noncontact IC card 30 When the above-mentioned variable data to the memory 34 of a noncontact IC card 30 is writing in, it becomes data which write-in data carry out old and new ***** , and are unreliable, the continuation by reoperation becomes useless, and a noncontact IC card 30 becomes use impossible.

[0009] Although what is necessary is to enlarge a loop antenna and just to give allowances to communication time, in order to prevent this, if communication area becomes large, the problem of interference with other cards will occur shortly.

[0010] It was made in order that this invention might solve this problem, and even if the abnormalities resulting from communication un-completing occur, continuation by reoperation is possible and it aims at offering the non-contact IC card system gating arrangement which can complete communication by reoperation.

MEANS

[Means for Solving the Problem] In order that this design may attain the above-mentioned purpose, in claim 1 It has the noncontact IC card presented to the field which can be communicated, and the gate which has the station which can be communicated. In the gating arrangement with which the above-mentioned noncontact IC card which received the appeal signal which the station concerned repeats a predetermined period performs a series of communications with the above-mentioned station, and notifies authorization/disapproval of gate passage While having the above-mentioned noncontact IC card possible [a change of two data

memory which wrote in the same fixed data] It has the data memory change flag automatically reversed for every completion of communication of a top Norikazu ream, read-out from memory was performed from the data memory corresponding to the contents of the flag concerned, and writing was taken as the configuration performed to another data memory.

[0012] In claim 2, the current contents of a flag of a data memory change flag were put on the reply signal answered and transmitted to the received above-mentioned appeal signal, it transmitted to it, and the station of the gate considered the noncontact IC card as the configuration which specifies the data memory corresponding to these contents of a flag, and communicates with the above-mentioned noncontact IC card.

[0013] In claim 3, the noncontact IC card was considered as the configuration which has the circuit which specifies the data memory corresponding to the reversed flag while it reversed the data memory change flag for every completion of a series of communications.

[0014] In claim 4, the station of the gate was taken as the configuration equipped with the display which directs reoperation, when the abnormalities of communication were detected.

OPERATION

[Function] In this invention, read-out of fixed data is performed from the memory section specified by a flag, and the writing of the variable data from the station side of the gate is performed to another memory section until a series of communications are completed.

EXAMPLE

[Example] Hereafter, the example of this invention is explained with reference to a drawing.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block block diagram of the noncontact IC card in the 1st example of this invention.

[Drawing 2] It is drawing showing the configuration of the memory in the above-mentioned example.

[Drawing 3] It is the block diagram of the memory of the noncontact IC card in the 2nd example of this invention.

[Drawing 4] It is the outline perspective view of the non-contact IC card system gating arrangement by this invention.

[Drawing 5] It is a flow chart explaining actuation of the above-mentioned example.

[Drawing 6] It is a communication chart in each above-mentioned example.

[Drawing 7] It is the schematic diagram of the conventional non-contact IC card system gating arrangement.

[Drawing 8] It is the conventional circuitry Fig. of a non-contact IC card system gating arrangement.

[Drawing 9] It is a communication chart in the above-mentioned conventional example.

[Description of Notations]

10 Gate

11A Display

20 Fixed Station

30 Noncontact IC Card

340 Memory

341 X Memory Section

342 Y Memory Section

343 Flag Memory Section

344 Memory Address Control Circuit

345 Address Change-over Circuit

346 Flag Generating Section

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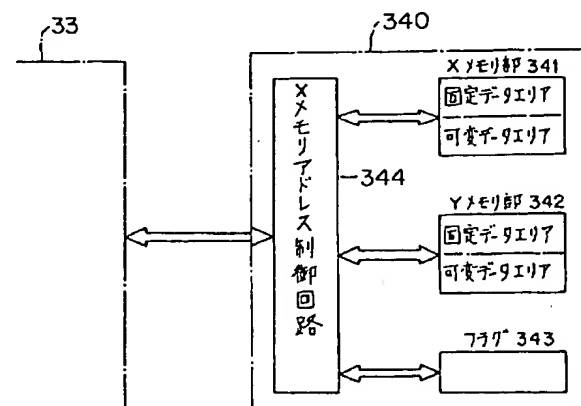
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(54)【発明の名称】 非接触 IC カード式ゲート装置

(57)【要約】

【目的】 交信未完結に起因する異常が発生しても、再操作による続行が可能で再操作により交信を完結させることができる非接触 IC カード式ゲート装置を提供することを目的とする。

【構成】 交信可能領域に差し出された非接触 IC カード 30 と交信可能な局 20 を有するゲート 10 を備え、当該局が所定周期で繰り返す呼掛け信号を受信した上記非接触 IC カードが上記局と一連の交信を行いゲート通過の許可／不許可を通知するゲート装置において、非接触 IC カードは同一固定データを書き込んだ 2 つのデータメモリ 341、342 を切換え可能に有するとともに、上記一連の交信の完了毎に自動的に反転されるデータメモリ切換えフラグ 343 を有し、メモリからの読み出しは当該フラグの内容に対応するデータメモリから行ない、書き込みは他のデータメモリに対して行なうことを特徴とする。



【特許請求の範囲】

【請求項1】 交信可能領域に差し出された非接触ICカードと交信可能な局を有するゲートを備え、当該局が所定周期で繰り返す呼掛け信号を受信した上記非接触ICカードが上記局と一連の交信を行いゲート通過の許可／不許可を通知するゲート装置において、

上記非接触ICカードは同一固定データを書き込んだ2つのデータメモリを切換え可能に有するとともに、上記一連の交信の完了毎に自動的に反転されるデータメモリ切換えフラグを有し、メモリからの読み出しは当該フラグの内容に対応するデータメモリから行ない、書き込みはもう一方のデータメモリに対して行なうことを特徴とする非接触ICカード式ゲート装置。

【請求項2】 非接触ICカードは、受信した上記呼掛け信号に応答して送信する応答信号に、データメモリ切換えフラグの現在のフラグ内容を載せて送信し、ゲートの局は、このフラグ内容に対応するデータメモリを指定して上記非接触ICカードと交信することを特徴とする請求項1記載の非接触ICカード式ゲート装置。

【請求項3】 非接触ICカードは、一連の交信の完了毎にデータメモリ切換え用フラグを反転するとともに、反転したフラグに対応するデータメモリを指定する回路を有することを特徴とする非接触ICカード式ゲート装置。

【請求項4】 ゲートの局は、交信の異常を検知した場合、再操作を指示する表示部を備えることを特徴とする請求項1～3記載の非接触ICカード式ゲート装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、交信可能領域に差し出された非接触ICカードと交信可能な局を有するゲートを備え、当該局が所定周期で繰り返す呼掛け信号を受信した上記非接触ICカードが上記局と所要の交信を行いゲート通過の許可／不許可を通知する非接触ICカード式ゲート装置に関する。

【0002】

【従来の技術】近年、メモリをマイクロコンピュータ等とともに内蔵してカード自体にデータ処理能力を持たせ、記憶容量も磁気カードに比して飛躍的に増大させ、外部装置とは無線で会話する非接触ICカードが開発されている。

【0003】この非接触ICカードの代表的なものは、外部装置が発生する振動エネルギー（例えば電磁波による誘導磁界）の場におかれると、アンテナ等の受波器で当該振動エネルギーを吸収して電力に変換する一方で、振動エネルギーに含まれるデータや命令を取り出して信号処理し、データの変更、追加、あるいは読み出し命令に基づく識別コードやデータの読み出し処理等を実行し、上記外部装置へ返信する。

【0004】定期券等にこの種の非接触ICカードを用

いた場合の駅の改札口等のゲート装置は図7に示すように当該定期券等と無線で会話することになる。

【0005】図7において、10は改札口のゲートであり、図8に示す固定局20を収納している。図7において、11は判定表示部である。30は乗客Mが保持している非接触ICカードであり図8に示すような回路を内蔵している。

【0006】この構成において、固定局20は送受信アンテナ（ループアンテナ）21から、呼掛け信号（トリガー信号）Soを一定の短い周期（数10ms）で繰り返して放出している。非接触ICカード30が図7に示すように交信可能領域（アンテナ上25cm以内）へ差し出されると、図9の交信チャートに示すように、当該非接触ICカード30は上記呼掛け信号（トリガー信号）Soを受信し、これを復調回路32で復調したのち制御回路33で解釈し、応答信号Qを送信したのち、メモリ34に格納している発着駅や経由駅および通用期間等の固定データを所定の順序で読み出し、当該データを変調回路35で変調して送受信アンテナ（ループアンテナ）31を通し放出する。このデータを書き込んだ信号を受信した固定局20は復調回路22で復調して制御回路23に送り、制御回路23は当該データをメモリ24に格納している照合用データと照合し、乗客の通過の許可／不許可を判定する。通過を許可する場合には、その旨および所要の命令を変調回路25、送受信アンテナ（ループアンテナ）21を通して非接触ICカード30へ送信する。この信号を受信した非接触ICカード30では上記命令（利用日や利用時刻、利用駅等の可変もしくは更新データの書き込み指令等）に基づく一連の処理を行なって、処理が終了したことを固定局20へ返信する。この返信を受信した固定局は判定表示部11に通過許可を表示する。

【0007】なお、送受信アンテナ（ループアンテナ）21はゲートを歩きながら通過する一人の乗客の非接触ICカード30との上記一連の交信が完結する時間を確保するに足る長さを持たせてある。

【0008】

【発明が解決しようとする課題】上記一連の交信の完了に要する時間は0.1～0.2秒程度であるが、ゲートを通過する人の流れの状態やカード提示姿勢により、交信エリアの周辺を瞬間的にかざすだけになる場合があり、このような場合は、交信時間が不足して、上記一連の交信が完結できず、交信異常が発生する。このような事態が、非接触ICカード30からの固定データ（発着駅や経由駅および通用期間等）の読み込み中に発生したのであれば、「もう一度、交信エリアを通して下さい」等と再操作を指示して再操作による続行が可能であるが、非接触ICカード30のメモリ34への上記可変データの書き込み中の場合には、書き込みデータが新旧まざったりして信頼性のないデータとなってしまう、再操

作による続行は無駄になり、非接触ICカード30は利用不能になる。

【0009】これを防ぐには、ループアンテナを大きくして交信時間に余裕を持たせればよいが、交信エリアが大きくなると、今度は、他のカードとの混信の問題が発生する。

【0010】本発明はこの問題を解消するためになされたもので、交信未完結に起因する異常が発生しても、再操作による続行が可能で再操作により交信を完結させることができる非接触ICカード式ゲート装置を提供することを目的とする。

【0011】

【課題を解決するための手段】本考案は上記目的を達成するため、請求項1では、交信可能領域に差し出された非接触ICカードと交信可能な局を有するゲートを備え、当該局が所定周期で繰り返す呼掛け信号を受信した上記非接触ICカードが上記局と一連の交信を行いゲート通過の許可／不許可を通知するゲート装置において、上記非接触ICカードは同一固定データを書き込んだ2つのデータメモリを切換え可能に有するとともに、上記一連の交信の完了毎に自動的に反転されるデータメモリ切換えフラグを有し、メモリからの読み出しは当該フラグの内容に対応するデータメモリから行ない、書き込みはもう一方のデータメモリに対して行なう構成とした。

【0012】請求項2では、非接触ICカードは、受信した上記呼掛け信号にตอบสนองして送信する応答信号に、データメモリ切換えフラグの現在のフラグ内容を載せて送信し、ゲートの局は、このフラグ内容に対応するデータメモリを指定して上記非接触ICカードと交信する構成とした。

【0013】請求項3では、非接触ICカードは、一連の交信の完了毎にデータメモリ切換えフラグを反転するとともに、反転したフラグに対応するデータメモリを指定する回路を有している構成とした。

【0014】請求項4では、ゲートの局は、交信の異常を検知した場合、再操作を指示する表示部を備える構成とした。

【0015】

【作用】本発明では、一連の交信が完了するまでは、固定データの読み出しはフラグが指定しているメモリ部から行ない、ゲートの局側からの可変データの書き込みはもう一方のメモリ部に対して行なわれる。

【0016】

【実施例】以下、本発明の実施例を図面を参照して説明する。

【0017】〔第1の実施例〕以下、本発明の1実施例を図面を参照して説明する。

【0018】図1において、340はデータメモリであって、図2に示すように、Xメモリ部341とYメモリ部342およびフラグ用メモリ部343に区分されてい

る。344はメモリアドレス制御回路であって、制御回路33と信号のやりとりをする。Xメモリ部341とYメモリ部342は読み出し専用の固定データエリアと読み出し／書き込み両用の可変データエリアからなり、両メモリ部341と342の固定データエリアには同一内容のデータが書き込まれている。なお、本実施例では、フラグ「0」はXメモリ部341に割当てられており、フラグ「1」はYメモリ部342に割当てられている。

【0019】次に、本実施例の動作を、図5に示す制御回路24の動作フローチャート、図6の(A)の交信チャートを参照して説明する。

【0020】今、フラグ用メモリ部343に切換えフラグ「0」が格納されているものとする。

【0021】固定局20は送受信アンテナ（ループアンテナ）21から、呼掛け信号（トリガー信号）S₀を一定の短い周期（数10ms）で繰り返し放出している。非接触ICカード30が前記交信可能領域（アンテナ上25cm以内）へ差し出されると、図6の(A)の交信チャートに示すように、当該非接触ICカード30は上記呼掛け信号（トリガー信号）S₀を受信し、これを復調回路32で復調したのち制御回路33で解読し、応答信号Qを送信する。この時、本実施例では、フラグメモリ部343からフラグ「0」が読み出され、応答信号Qはこのフラグ「0」を載せて送信される。固定局20では、フラグ「0」からXメモリ部341を指定し、Xメモリ部341に対する読み出し指令（リード指令）を送信する。非接触ICカード30は固定局20からの上記リード指令に基づきメモリ340のXメモリ部341に格納している発着駅や経由駅および通用期間等の固定データを所定の順序で読み出し、当該固定データを変調回路35で変調して送受信アンテナ（ループアンテナ）31を通し放出する。この固定データを載せた信号を受信した固定局20は復調回路22で復調して制御回路23に送り、制御回路23は当該固定データをメモリ24に格納している照合用データと照合し、乗客の通過の許可／不許可を判定する。通過を許可する場合には、その旨および所要の命令（書き込み指令およびYメモリ部へ書き込む情報等）を変調回路25、送受信アンテナ（ループアンテナ）21を通して非接触ICカード30へ送信する。この信号を受信した非接触ICカード30では上記命令に基づく一連の処理、例えば、カード利用日、利用時刻、利用駅等の可変データのYメモリ部342への書き込み処理を行なって、処理が完了したことを固定局20へ返信する。この返信を受信した固定局20では、フラグ切換え指令を送信する。これにより非接触ICカード30はフラグ反転（フラグメモリ部343の内容を「1」にする）を行なう。

【0022】本実施例では、（1）非接触ICカード30からの固定データの読み出しが所定時間内に完了しない時、（2）固定局20からの命令に基づくYメモリ部

342（もしくはXメモリ部341）への書き込み処理が所定時間内に完了しない時、(3)この時点からフラグ反転までの時間が所定時間を越えた時に、固定局20は異常（交信未完結）と判定して異常信号を発生し、図5に示すようにゲート10に設けた異常表示部11Aに、再操作を依頼・指示するメッセージを表示する。

【0023】この指示に従い、乗客Mが非接触ICカード30を再度交信領域に差し出すと、フラグは反転されていないので、フラグメモリ部343から切換えフラグ「0」が読み出され、応答信号Qはこの切換えフラグ「0」を載せて送信され、上記と同じ処理シーケンスが繰り返される。

【0024】本実施例では、メモリ340の固定データの読み出しはフラグが指定するメモリ部から行ない、可変データ（更新データ）の書き込みはもう一つのメモリ部に対して行なうから、乗客Mが再操作を行なっても、前記したような新旧データがまざって書き込まれることはない。

【0025】〔第2の実施例〕図3は、本発明の第2の実施例を示したもので、アドレス切換回路345、フラグ発生部（例えば、フリップフロップ）346を有している点において、図2の第1の実施例と相違する。なお、本実施例の交信チャートを図6の(B)に示す。

【0026】本実施例では、フラグが「0」の場合、アドレス切換回路345はXメモリ部341を選択し、切換えフラグが「1」に反転した場合は、アドレス切換回路345はYメモリ部342を選択する。

【0027】この場合、切換えフラグの反転は、非接触ICカード30内で、例えば、Xメモリ部341もしくはYメモリ部342への可変データの書き込み完了時に制御回路33がフラグ発生部346に切換えを指令し、応答信号Qにはこのフラグの内容は載せない。

【0028】このようにすれば、応答信号Qにフラグ「0」または「1」を載せる必要がなく、固定局20側は切換えフラグの判定等が不要で、その分、プログラムが簡単になる。

【0029】

【発明の効果】本発明は以上説明した通り、同一固定デ

ータを書き込んだ2つのメモリ部を有し、一連の交信が完了するまでは、データの読み出しはフラグが指定しているメモリ部から行い、データの書き込みはもう一方のメモリ部に対して行なうから、交信未完結に起因する異常が発生した場合に、再操作しても、異常発生直前のメモリ操作を再現できるので、書き込みデータが新旧まざったりする恐れがなく、続行して交信を完結させることができる。

【図面の簡単な説明】

【図1】本発明の第1の実施例における非接触ICカードのブロック構成図である。

【図2】上記実施例におけるメモリの構成を示す図である。

【図3】本発明の第2の実施例における非接触ICカードのメモリの構成図である。

【図4】本発明による非接触ICカード式ゲート装置の概略斜視図である。

【図5】上記実施例の動作を説明するフローチャートである。

【図6】上記各実施例における交信チャートである。

【図7】従来の非接触ICカード式ゲート装置の概略図である。

【図8】非接触ICカード式ゲート装置の従来の回路構成図である。

【図9】上記従来例における交信チャートである。

【符号の説明】

10 ゲート

11A 表示部

20 固定局

30 非接触式ICカード

340 メモリ

341 Xメモリ部

342 Yメモリ部

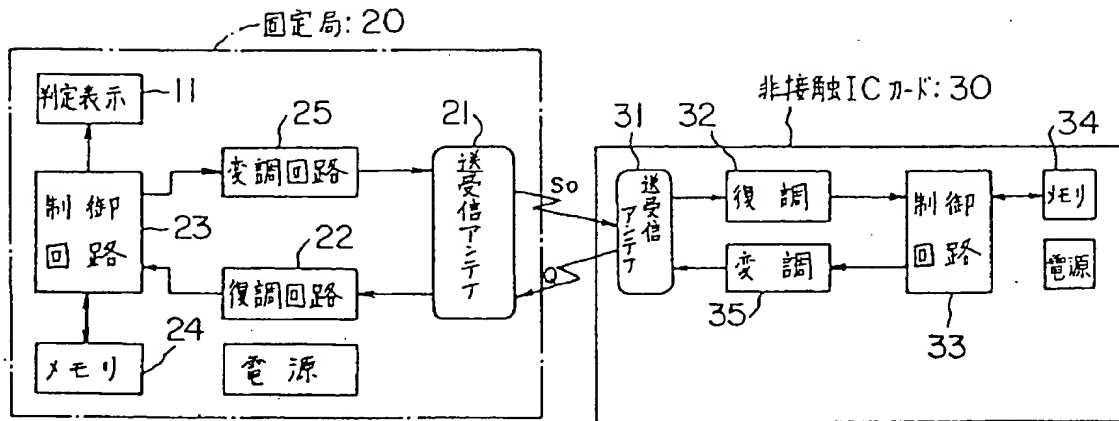
343 フラグメモリ部

344 メモリアドレス制御回路

345 アドレス切換回路

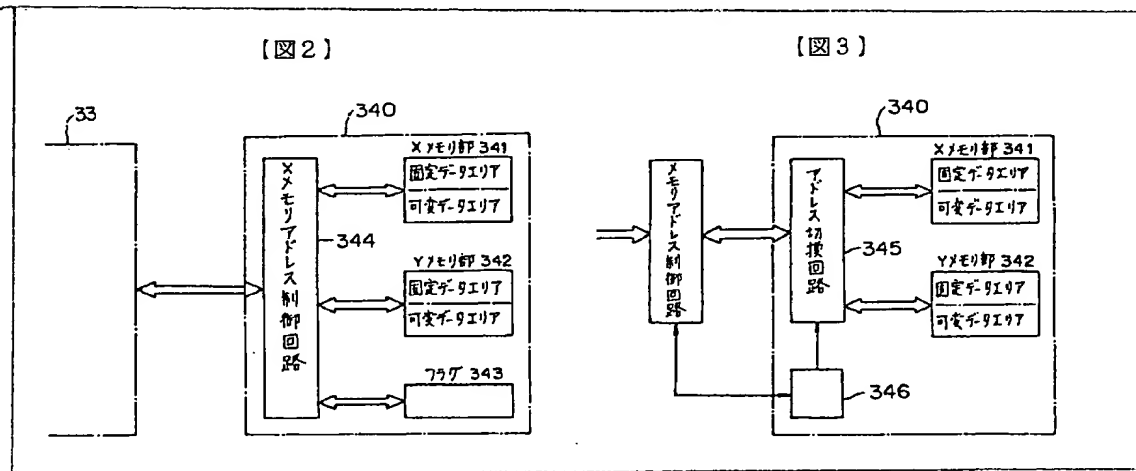
346 フラグ発生部

【図1】



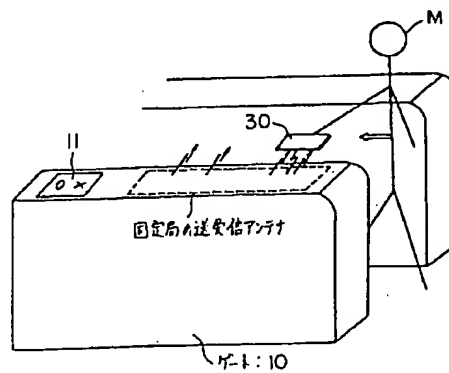
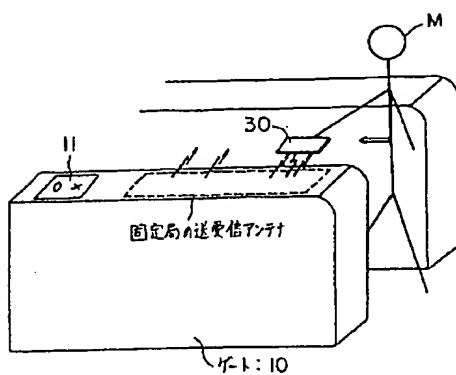
【図2】

【図3】

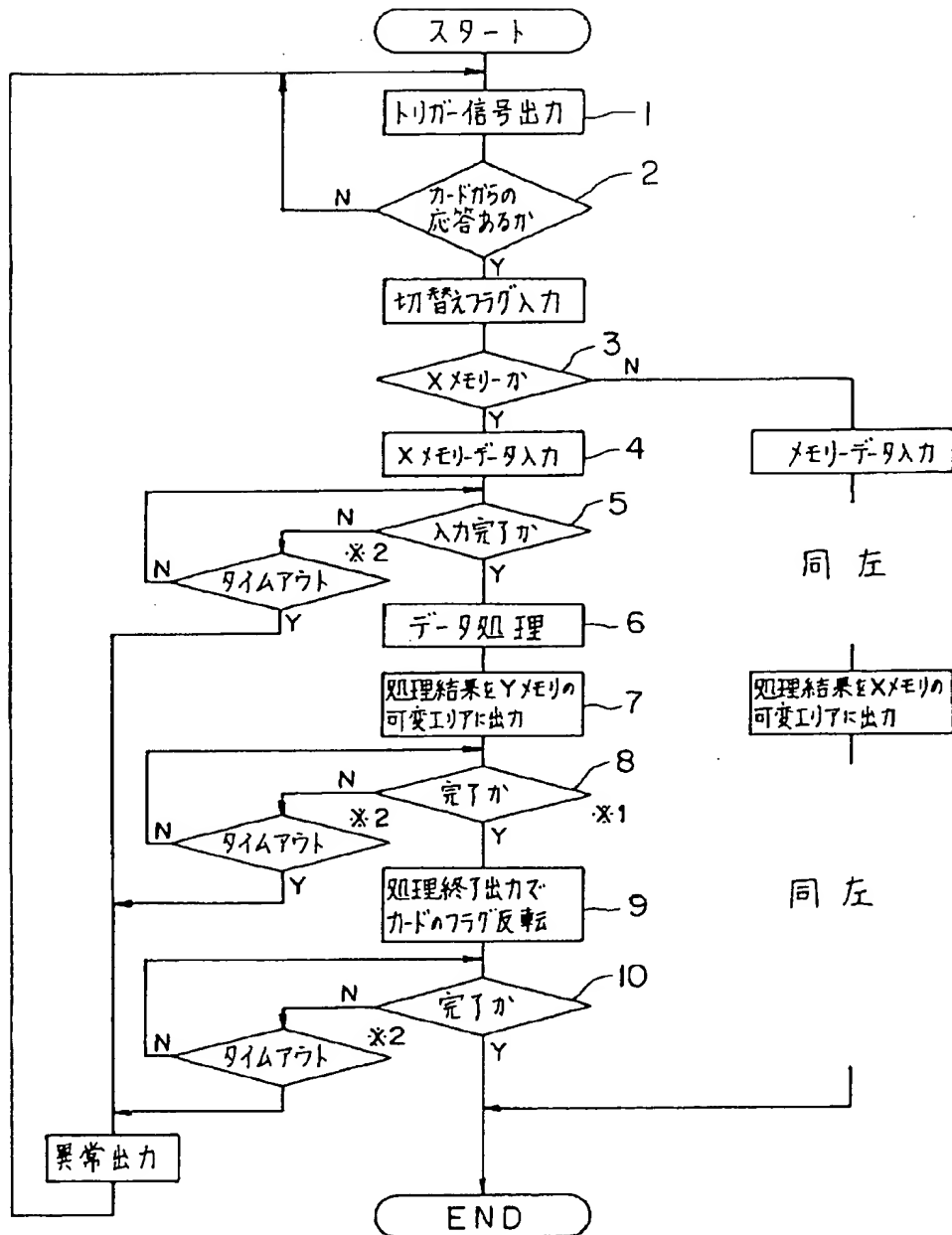


【図4】

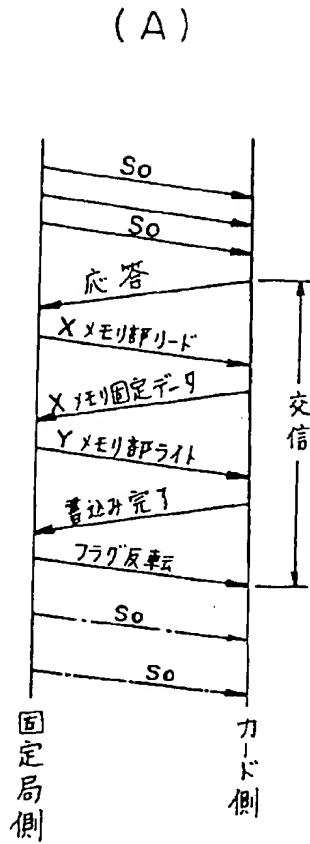
【図7】



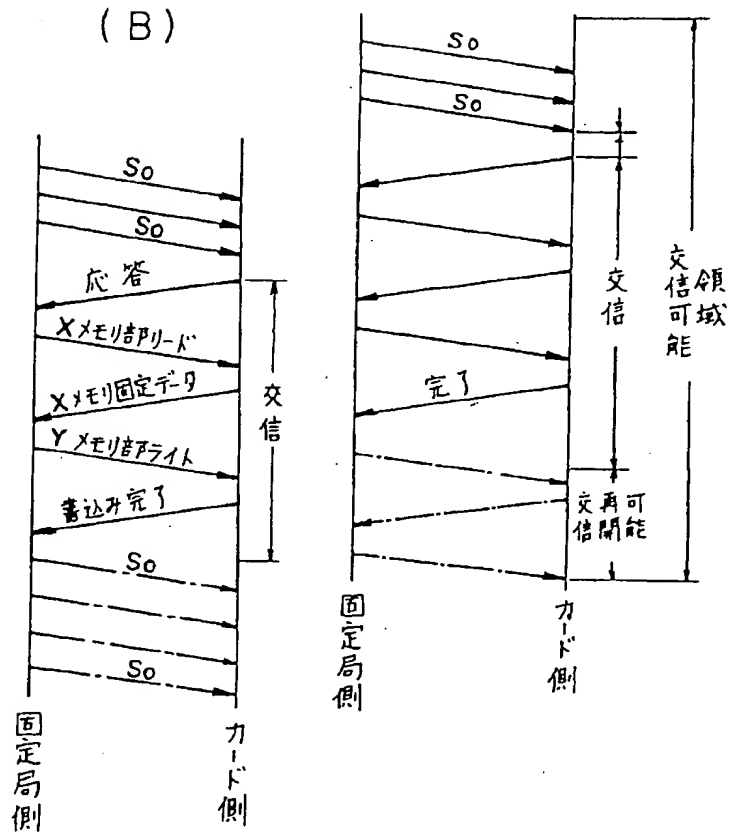
【図5】



【図6】



【図9】



【図8】

